

Claims

1. A laser wavelength conversion apparatus comprising:

a wavelength conversion element for performing wavelength conversion of laser light entered from an entrance end surface and delivering laser light of a shortened wavelength from an exit end surface;

a heat sink surrounding a peripheral surface of said wavelength conversion element and having cooling fins;

a heater for uniform heating disposed in said heat sink in such a state as to surround periphery of said wavelength conversion element;

a temperature sensor for measuring a temperature of said wavelength conversion element; and

a heater controller for controlling an electric current supplied to said heater for uniform heating so that the temperature detected by said temperature sensor becomes a preset temperature.

2. A laser wavelength conversion apparatus as claimed in claim 1, characterized in that of the cooling fins of said heat sink, the cooling fins located on side surfaces are arranged in such a state as to extend in a vertical direction.

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3. A laser wavelength conversion apparatus as claimed in claim 1, characterized in that said heater for uniform heating is a plurality of rod-shaped heaters arranged in said heat sink at equal intervals in such a state as to surround the periphery of said wavelength conversion element and in such a state as to extend in a direction of an optical axis.

4. A laser wavelength conversion apparatus as claimed in claim 1, characterized in that said heater for uniform heating is a film-shaped heater disposed in such a state as to surround an outer peripheral surface of said heat sink.

5. A laser wavelength conversion apparatus as claimed in claim 1, characterized in that heaters for temperature gradient correction are placed on an entrance side end surface and an exit side end surface of said heat sink, and

said heater controller exercises temperature control such that an amount of heat generation from said heater for temperature gradient correction on an entrance end surface side is larger than an amount of heat generation from said heater for temperature gradient correction on an exit end surface side.

6. A laser wavelength conversion apparatus as

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claimed in claim 1, characterized in that a loop gas pipe for blowing a cooling gas uniformly from surroundings toward the exit end surface of said wavelength conversion element is disposed on an exit end surface side of said heat sink.

7. A laser wavelength conversion apparatus as claimed in claim 1, characterized in that said wavelength conversion element is divided along a direction of an optical axis.

8. A laser wavelength conversion apparatus as claimed in claim 1, characterized in that said wavelength conversion element is divided along a direction of an optical axis, and an anti-reflection coating is applied to end surfaces of divisional wavelength conversion elements.

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9. A laser wavelength conversion apparatus as claimed in claim 1, characterized in that said wavelength conversion element is divided along a direction of an optical axis, and optical polishing is applied to end surfaces of divisional wavelength conversion elements.

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